WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE,
SALT RIVER VALLEY WATER USERS ASSOCIATION
and
ARIZONA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with the Federal, State and private organizations listed on the last page of this report.

AS OF
MAR. 1, 1963

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 4170, Portland 8, Oregon.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
Western United States	Monthly (Feb.-May)	Portland, Oregon	All Cooperators
STATES			
Alaska	Monthly (Mar.-May)	Palmer, Alaska	Alaska S.C.D.
Arizona	Semi-Monthly (Jan. 15 - Apr. 1)	Phoenix, Arizona	Salt R. Valley Water Users Assoc. Ariz. Agr. Exp. Station
Colorado and New Mexico	Monthly (Feb.-May)	Fort Collins, Colorado	Colo. State University Colo. State Engineer N. Mex. State Engineer
Idaho	Monthly (Jan.-June)	Boise, Idaho	Idaho State Reclamation Engineer
Montana	Monthly (Jan.-June)	Bozeman, Montana	Mont. Agr. Exp. Station
Nevada	Monthly (Jan.-May)	Reno, Nevada	Nevada Dept. of Conservation and Natural Resources - Division of Water Resources
Oregon	Monthly (Jan.-June)	Portland, Oregon	Oreg. State University Oregon State Engineer
Utah	Monthly (Jan.-June)	Salt Lake City, Utah	Utah State Engineer
Washington	Monthly (Feb.-June)	Spokane, Washington	Wn. State Dept. of Conservation
Wyoming	Monthly (Feb.-June)	Casper, Wyoming	Wyoming State Engineer

PUBLISHED BY OTHER AGENCIES

REPORTS	ISSUED	AGENCY
British Columbia	Monthly (Feb.-June)	Water Rights Br., Dept. of Lands, Forests and Natural Resources, Parliament Bldg., Victoria, B.C., Canada
California	Monthly (Feb.-May)	Calif. Dept. of Water Resources, P.O. Box 388, Sacramento, Calif.

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WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

(Salt, Verde, Gila and Part of Lower Colorado River Basin)

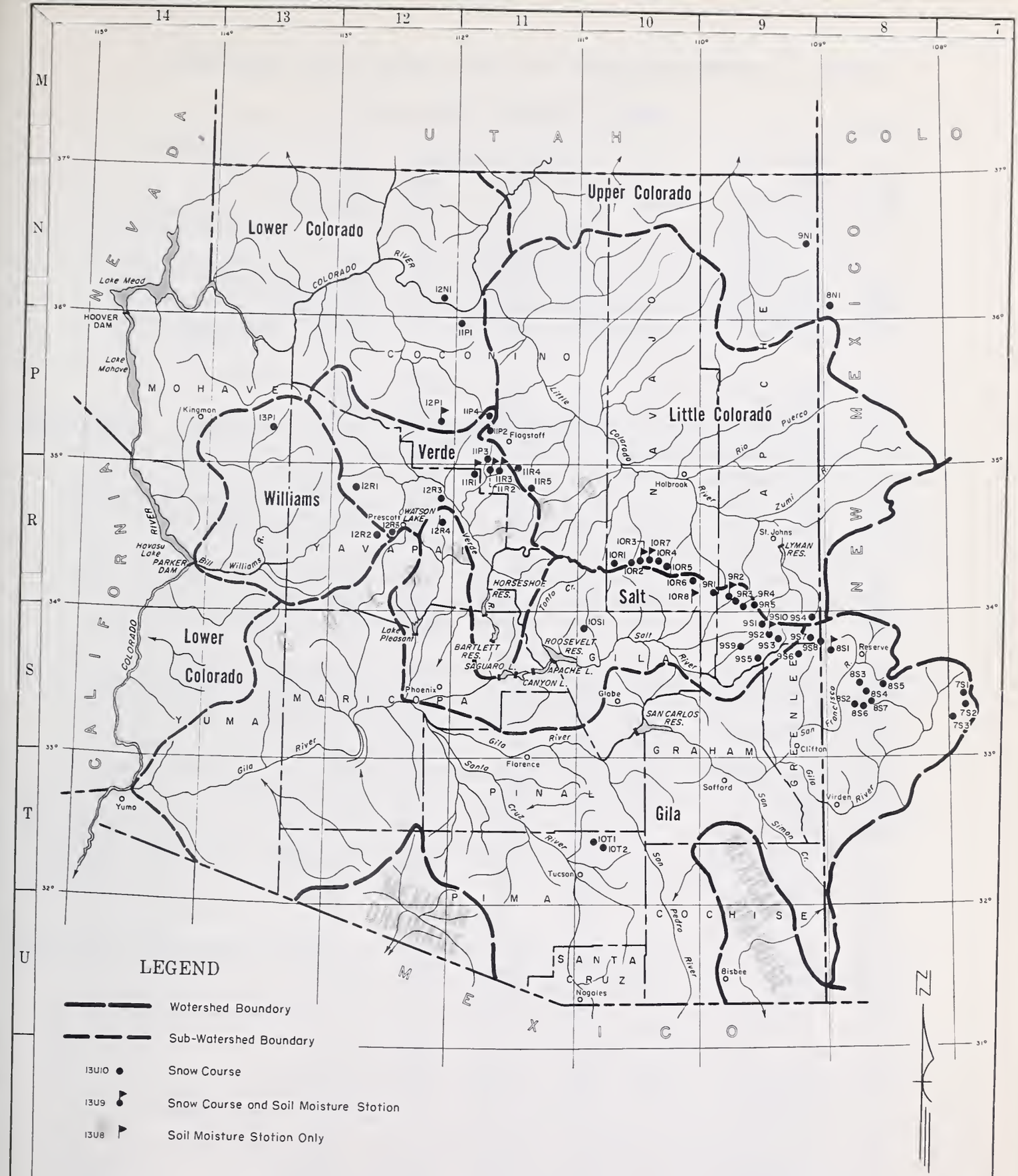
Report prepared by

RICHARD W. ENZ...SNOW SURVEY SUPERVISOR
SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX 25, ARIZONA

Issued by

ROBERT V. BOYLE
STATE CONSERVATIONIST
SOIL CONSERVATION SERVICE

VICTOR I. CORBELL
PRESIDENT
SALT RIVER VALLEY WATER USERS ASSOCIATION



ARIZONA
COOPERATIVE SNOW SURVEYS
Snow Courses and Sub-Watersheds

JANUARY 1963

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE USDA SCS PORTLAND OREG 1960 M-2690

7-0-19920-1

INDEX to SNOW COURSES and SOIL MOISTURE STATIONS

NUMBER **	NAME	SEC	TWP	RGE ***	ELEVATION	RIVER BASIN
11P3	Antelope Park	29	19N	8E	7300	Verde.....Discontinued
9S1	Baldy (p)	28	7N	27E	9125	Salt-Little Colorado
10T1	Bear Wallow	6	12S	16E	8100	Gila
9S6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9S3	Big Lake Knoll	2	5N	28E	8800	Salt-Frisco-Little Colorado--Discontinued
7S3	Black Canyon	8	13S	11W****	6790	Gila.....Discontinued
9S10-*	Black River Divide	11	6N	27E	9100	Salt-Little Colorado
12N1	Bright Angel	34	33N	3E	8400	Lower Colorado
12R1	Camp Wood	3	16N	6W	5700	Williams-Verde
10R3-M	Canyon Creek	18	11N	15E	7500	Salt-Little Colorado--Replaced by 10R7-M
10R7-M	Canyon Creek #2	18	11N	15E	7500	Salt-Little Colorado
11R2-M	Casner Park	19	18N	8E	6930	Verde
12P1-M	Chalender	27	22N	3E	7100	Verde
10R8-*	Corduroy Creek	Lat. 34°07'N.		Long.110°08'W.§	6000	Salt
9S9	Corn Creek (p)	Lat. 33°45'N.		Long.109°45'W.§	7730	Salt.....Not Read
8S3	Corner Mountain	7	10S	17W****	8850	Gila-Frisco....Not Read
9S7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10R2	Elk	31	11N	14E	7600	Salt-Little Colorado..Discontinued
10R6	Forest Dale	2	9N	21E	6430	Salt-Little Colorado
11P2	Fort Valley	22	22N	6E	7350	Verde-Little Colorado
9R5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8S1-M	Frisco Divide	31	6S	20W****	8000	Frisco-Gila
12R4	Gaddes Canyon	11	15N	2E	7600	Verde-Agua Fria
10R5	Gentry	36	11N	15E	7600	Salt
11P1	Grand Canyon	21	30N	4E	7500	Lower Colorado
11R5	Happy Jack	30	17N	9E	7630	Verde
10R4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
8S6	Ice King	6	11S	18W	8020	Frisco-Gila
7S2	Inman	6	11S	10W****	7800	Gila
12R2	Iron Springs	22	14N	3W	6200	Williams-Verde
9S2	Maverick Fork (p)	13	6N	27E	9050	Salt
9R4	McKay Peak	13	7N	24E	8250	Salt.....Not Read
9R2-M	McNary	14	8N	23E	7200	Salt-Little Colorado
9R1	Milk Ranch	28	8N	23E	7000	Salt
12R3	Mingus Mountain	3	15N	2E	7100	Verde-Agua Fria
8S2	Mogollon	2	11S	19W****	7000	Frisco-Gila
11R4	Mormon Lake	13	18N	8E	7350	Verde-Little Colorado
11R3-M	Mormon Mountain	14	18N	8E	7500	Verde
11R1-M	Munds Park	7	18N	7E	6500	Verde
8S4	N-Bar Lake	16	10S	17W****	8600	Gila.....Not Read
8S5	Negrito	6	10S	16W****	8200	Gila.....Not Read
9S4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9S5	Pacheta	At Town of Maverick, Ariz.			7800	Salt
8S7	Redstone Trail	5	11S	18W	8600	Frisco-Gila
9N1	Roof Butte	15	8N	6W*****	8500	Little Colorado-Not Read
10T2	Rose Canyon	15	12S	16E	7300	Gila
11P4	Snow Bowl	36	23N	6E	10,260	Verde
9S8	State Line	6	6S	21W****	8000	Gila-Frisco
7S1	Taylor Creek	20	10S	10W****	7850	Gila
9R3	Trout Creek	5	7N	24E	6400	Salt.....Not Read
8N1	Washington Pass	Lat. 36°05'N.		Long.108°50'W.	8600	Little Colorado-Not Read
12R5	White Spar	19	13N	2W	6000	Verde
13P1	Willow Ranch	16	21N	11W	5000	Williams
10R1	Woods Canyon	15	11N	13E	7640	Salt-Little Colorado--Discontinued
10S1	Workman Creek	33	6N	14E	6900	Salt

* SOIL MOISTURE STATION ONLY

** NUMBER INDICATES LOCATION OF SNOW COURSE WITHIN COORDINATE RECTANGLE. THUS 9N1 IS COURSE #1 IN COORDINATE RECTANGLE 9N.

*** ALL IN GILA AND SALT RIVER BASE AND MERIDIAN EXCEPT WHERE OTHERWISE INDICATED.

**** NEW MEXICO PRINCIPAL MERIDIAN

***** NAVAJO BASE

M SOIL MOISTURE STATION INSTALLED ON OR IN VICINITY OF SNOW COURSE.

§ UNSURVEYED

(p) STORAGE GAGE INSTALLED ON OR IN VICINITY OF SNOW COURSE.

ARIZONA WATER SUPPLY OUTLOOK

MARCH 1, 1963

* *
* The Water Supply Outlook for Arizona is normal in most areas. *
* Runoff, however, is forecast to be below average, ranging from *
* about 40% of average on the Verde and Little Colorado Rivers to *
* average on the Gila River. Reservoir Storage is good in cen- *
* tral Arizona as a result of carry-over storage from last year. *
* *
* *

SNOW COVER: No appreciable precipitation has occurred since February 15. Many mountain areas received none at all; consequently the meager snow cover of two weeks ago is dwindling. Snow cover is lowest on the Verde Watershed where only 8% of average remains. Ten out of 15 snow courses reported no snow. The snow pack improves as we move eastward along the Mogollon Rim. The Salt and Gila Watersheds have 46-59% of average snow cover respectively. A small area near Mogollon, New Mexico, is the only significant area with above normal snow cover; this will influence the runoff of the Gila and Frisco Rivers.

RESERVOIR STORAGE: San Carlos and the Salt River Project Reservoirs showed good increase in storage the past two weeks, with a net gain of 19,000 acre feet and 26,000 acre feet respectively. Other Reservoirs in the State showed only slight increases. The Salt River Project Reservoirs now contain 140% of average, and are 52% of capacity, with a storage volume of 1,082,700 acre feet; San Carlos Reservoir with 131,784 acre feet is 128% of average but only 11% of capacity; Lyman Reservoir contains over twice the average storage for this date. Lake Pleasant, Watson Lake, and Show Low Lake, are very low with no prospects for significant improvement.

STREAMFLOW AND WATER SUPPLY: February runoff has been much above average on the Salt and Gila Rivers with 72,500 and 54,000 acre feet being produced, respectively. This is 2-1/2 - 4 times the average for the month of February. This is not as good as it first appears, when we consider that January was far below normal, and with very little snow pack in the mountains, subsequent runoff will be low. We simply have received most of the spring runoff during February. Runoff forecasts have been reduced in most cases because no precipitation has been received since the last forecast. The Salt River System is forecast to produce 185,500 acre feet, or 53% of the average runoff expected for the March-May period. Near normal runoff is forecast for the Gila River.

SOIL MOISTURE: At low and intermediate elevations the surface soil is drying rapidly as a result of warm windy weather. The soil profile at higher elevations contains good moisture; and efficient water yield would result in the White Mountains and Mogollon area from good subsequent precipitation.

STREAM FLOW FORECASTS - MARCH 1, 1963

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

SUB-WATERSHED, STREAM and STATION	SEASONAL STREAM FLOW IN THOUSANDS OF ACRE FEET FORECAST PERIOD - MARCH - MAY, INCLUSIVE					
	Forecast Runoff 1963	Percent 15-Year Average	Measured Runoff 1962	1961	1960	1943-57 Average
Salt River at Intake	120	60	416.7	65.1	320.0	200.4
Tonto River above Roosevelt	11.5	46	37.6	4.8	40.3	25.0
Verde River above Horseshoe	54	43	134.9	46.3	139.3	124.9
Gila River at Virden	29	105	62.7	12.9	58.7	27.6
Gila River near Solomon	53	101	123.4	17.7	113.5	52.3
Frisco River at Clifton	25	99	59.2	10.5	59.2	25.3
Little Colorado River above Lyman Dam (March-June, Incl.)	2.3	41	24.5	1.0	13.5	5.6
Gila River near Solomon (Month of March)	26	99	36.2	6.7	76.9	26.3

Gila River near Solomon is forecast to remain above 100 cfs until April 30.

Granite Creek is forecast to flow enough additional water to fill Watson Lake one-quarter of capacity.

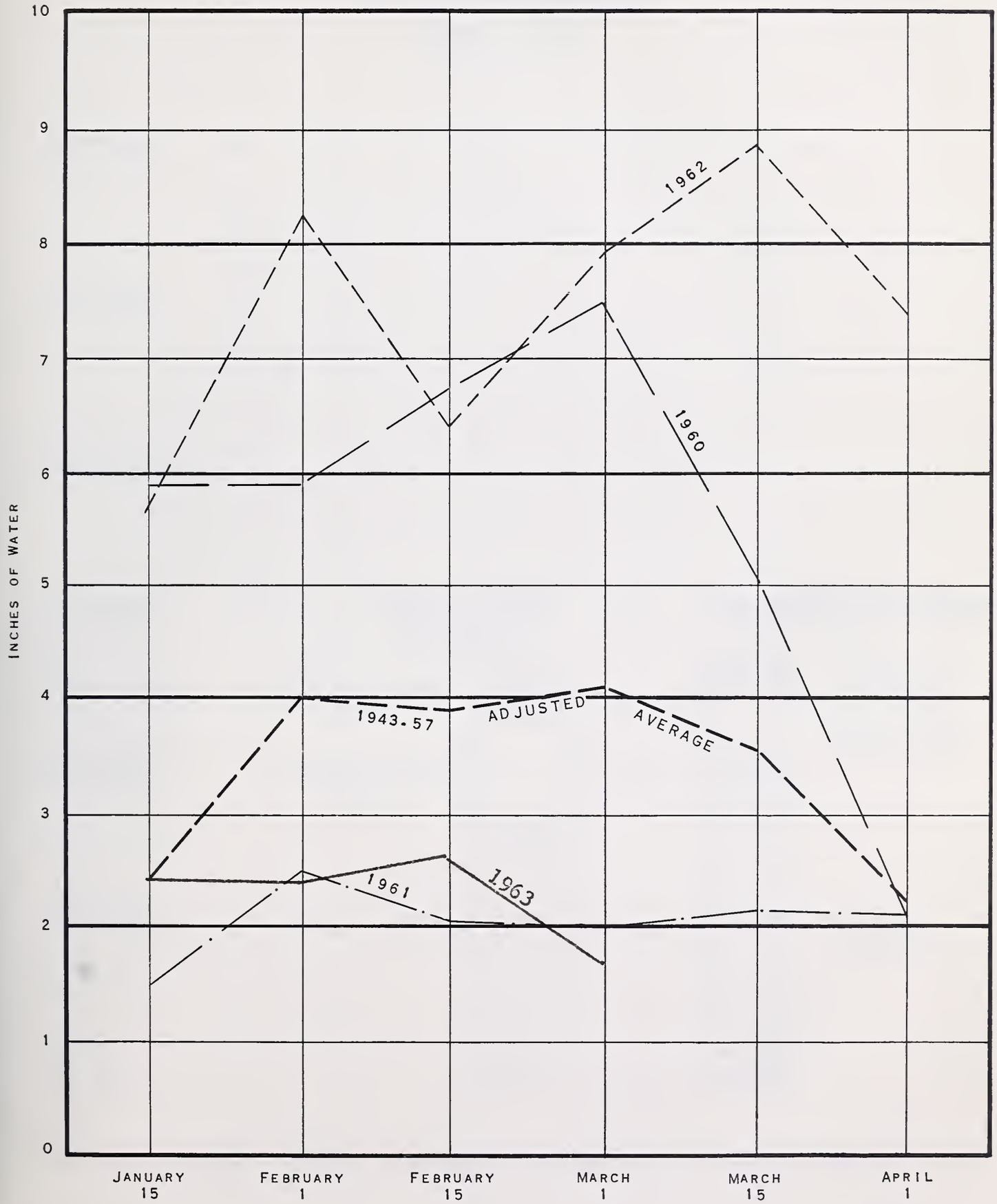
STATUS OF ARIZONA RESERVOIR STORAGE - ABOUT MARCH 1, 1963

SUB-WATERSHED and/or STREAM	RESERVOIR	USABLE CAPACITY 1000s ACRE FT.	USABLE STORAGE - 1000s ACRE FEET			
			1963	1962	1961	15-Year Average 1943-57
		GILA RIVER SUB-WATERSHED				
Agua Fria	Lake Pleasant	163.8	2.8	14.8	26.8	24.9
Granite	Watson Lake	4.7	0.7	---	---	---
Gila	San Carlos	1,206.0	131.8	169.0	3.2	102.2
Verde	Bartlett	179.5	20.8	99.5	39.7	54.4
Verde	Horseshoe	142.8	1.4	33.7	1.5	16.8*
Salt	Roosevelt	1,382.0	708.9	689.8	841.4	432.8
Salt	Apache	245.0	231.7	184.0	241.6	203.5
Salt	Canyon	58.0	53.4	53.3	47.3	42.4
Salt	Saguaro	70.0	66.5	66.7	65.8	38.5
		LOWER COLORADO RIVER SUB-WATERSHED				
Colorado	Lake Havasu	619.4	515.7	532.6	536.2	559.2
Colorado	Lake Mohave	1,810.0	1,701.5	1,751.0	1,702.0	1,467.0*
Colorado	Lake Mead	27,207.0	22,496.0	18,249.0	18,753.0	16,929.0
Little Colorado	Lyman	30.6	13.5	3.6	6.8	6.3
Little Colorado	Show Low Lake	5.1	1.7	5.1	0.1	---

* Average is for less than 15 years of record in the 1943-57 period.

RELATIVE SNOW WATER ACCUMULATION
ARIZONA

MARCH 1, 1963

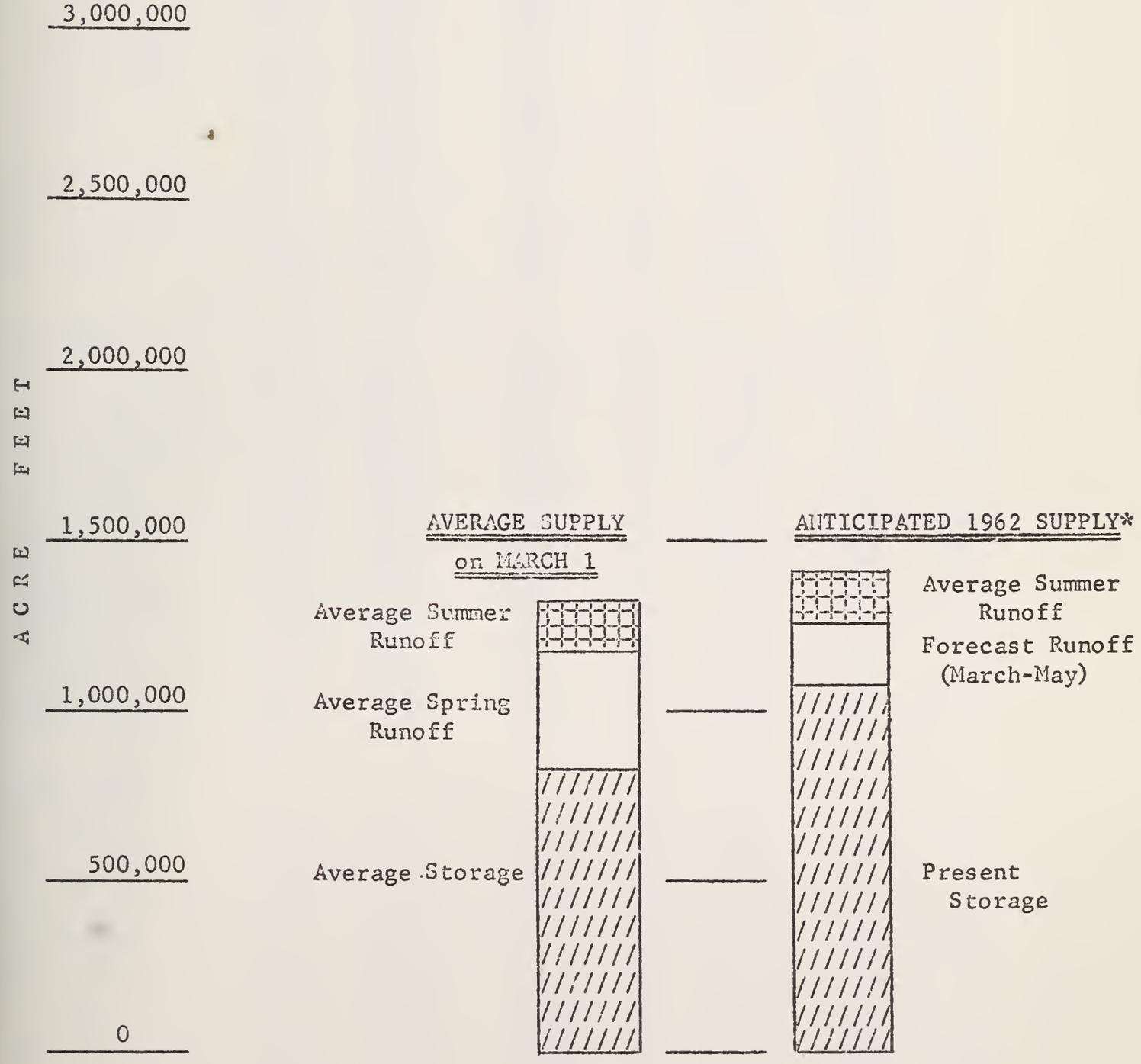


This graph represents the average snow water content on eleven selected snow courses on Arizona Sub-Watersheds.

WATER SUPPLY INVENTORY

SALT RIVER VALLEY SYSTEM

MARCH 1, 1963



* Based on present Storage + Forecast Spring runoff + Average Summer runoff.

ARIZONA SNOW SURVEYS - ABOUT MARCH 1, 1963

SUB-WATERSHED and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS 1963 Date of Survey	Snow Depth (In.)	Water Content (In.)	PAST RECORD Water Content (Inches) 1962	1961	1943-57 Average
GILA RIVER								
Bear Wallow	10T1	8100	2/27	9	2.9	13.0	0.7	2.4 **
Beaver Head	9S6	8000	2/28	2	0.7	5.8	2.1	2.3
Coronado Trail	9S7	8000	3/1	2	0.5	3.1	1.6	2.3
Frisco Divide	8S1-M	8000	3/1	1	0.3	2.3	1.4	1.7
Ice King	8S6	8000	2/28	18	7.2	11.3	3.9	---
Inman	7S2	7800	2/27	T	T	T	0.0	0.4 **
Mogollon	8S2	7000	2/28	7	2.9	5.1	1.8	1.4 **
Nutrioso	9S4	8500	3/1	1	0.4	2.1	1.0	1.7
Redstone Trail	8S7	8600	2/28	20	7.3	17.8	4.6	---
Rose Canyon	10T2	7300	2/27	3	0.9	8.4	0.0	0.8 **
State Line	9S8	8000	3/1	1	0.2	2.5	1.1	2.1
SALT RIVER								
Baldy *	9S1	9125	2/28	16	5.0	15.0	5.1	7.4 **
Beaver Head	9S6	8000	2/28	2	0.7	5.8	2.1	2.3
Canyon Creek #2	10R7-M	7500	2/27	0	0.0	6.8	0.7	---
Coronado Trail	9S7	8000	3/1	2	0.5	3.1	1.6	2.3
Forest Dale	10R6	6430	2/27	0	0.0	1.7	T	1.0
Ft. Apache *	9R5	9160	2/28	22	5.9	15.4	5.1	8.0 **
Gentry	10R5	7600	2/27	0	0.0	5.7	0.3	4.2 **
Heber	10R4	7600	2/27	0	0.0	6.8	0.7	4.3 **
Maverick Fork	9S2	9050	2/28	18	6.0	18.4	5.9	9.0 **
McNary	9R2-M	7200	2/27	0	0.0	4.7	T	2.4
Milk Ranch	9R1	7000	2/27	0	0.0	2.5	T	0.9
Nutrioso	9S4	8500	3/1	1	0.4	2.1	1.0	1.7
Pacheta	9S5	7800	2/28	3	1.4	8.0	0.0	2.6 **
Workman Creek	10S1	6900	2/27	7	2.5	12.6	T	3.4 **
VERDE RIVER								
Camp Wood	12R1	5700	3/1	0	0.0	1.7	0.0	0.8 **
Casner Park	11R2-M	6930	2/26	T	T	8.1	T	2.8 **
Chalender	12P1-M	7100	2/26	0	0.0	6.4	0.6	2.8 **
Copper Basin Div.	12R6	6720	2/28	0	0.0	---	---	---
Fort Valley *	11P2	7350	2/28	0	0.0	6.0	0.0	2.3 **
Gaddes Canyon	12R4	7600	2/28	9	2.3	10.6	0.8	---
Happy Jack	11R5	7630	2/27	2	0.3	9.3	T	3.8 **
Iron Springs *	12R2	6200	2/28	0	0.0	1.7	T	0.9 **
Mingus Mountain	12R3	7100	2/28	0	0.0	1.9	0.0	1.2 **
Mormon Lake *	11R4	7350	2/26	2	0.5	8.3	1.1	4.5 **
Mormon Mountain	11R3-M	7500	2/26	4	1.3	12.3	1.0	6.5 **
Munds Park	11R1-M	6500	2/25	0	0.0	4.4	0.0	2.4 **
Newman Park	11R6	6750	2/25	0	0.0	---	---	---
Snow Bowl	11P4	10260	Report	delayed		17.1	No Survey	--
White Spar	12R5	6000	2/28	0	0.0	---	---	---

* On Adjacent Drainage

** 1943-57 Adjusted Average

ARIZONA SNOW SURVEYS - ABOUT MARCH 1, 1963

SUB-WATERSHED and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS 1963 Date of Survey	Snow Depth (In.)	Water Content (In.)	PAST RECORD Water Content (Inches) 1962	1961	1943-57 Average
WILLIAMS RIVER								
Camp Wood *	12R1	5700	3/1	0	0.0	1.7	0.0	0.8 **
Copper Basin Div.*	12R6	6720	2/28	0	0.0	---	---	---
Iron Springs	12R2	6200	2/28	0	0.0	1.7	T	0.9 **
Willow Ranch	13P1	5000	2/27	0	0.0	T	0.0	0.4 **
LOWER COLORADO RIVER								
Bright Angel	12N1	8400	No Survey			9.5	5.8	9.4 **
Chalender *	12P1-M	7100	2/26	0	0.0	6.4	0.6	2.8 **
Fort Valley	11P2	7350	2/28	0	0.0	6.0	0.0	2.3 **
Grand Canyon	11P1	7500	3/1	0	0.0	3.7	0.3	2.0 **
LITTLE COLORADO RIVER								
Baldy	9S1	9125	2/28	16	5.0	15.0	5.1	7.4 **
Canyon Creek #2	10R7-M	7500	2/27	0	0.0	6.8	0.7	---
Forest Dale	10R6	6430	2/27	0	0.0	1.7	T	1.0
Ft. Apache	9R5	9160	2/28	22	5.9	15.4	5.1	8.0 **
Fort Valley	11P2	7350	2/28	0	0.0	6.0	0.0	2.3 **
Gentry	10R5	7600	2/27	0	0.0	5.7	0.3	4.2 **
Happy Jack *	11R5	7630	2/27	2	0.3	9.3	T	3.8 **
Heber	10R4	7600	2/27	0	0.0	6.8	0.7	4.3 **
McNary	9R2-M	7200	2/27	0	0.0	4.7	T	2.4
Mormon Lake	11R4	7350	2/26	2	0.5	8.3	1.1	4.5 **
Mormon Mountain	11R3-M	7500	2/26	4	1.3	12.3	1.0	6.5 **
Nutrioso	9S4	8500	3/1	1	0.4	2.1	1.0	1.7

* On Adjacent Drainage
** 1943-57 Adjusted Average

LIST OF SNOW SURVEYORS

SNOW COURSE	SURVEYOR
Baldy	SCS and SRVWUA
Bear Wallow	Forest Service - Allan Hinds
Beaver Head	N. A. Josh
Bright Angel	National Park Service - Vern Ruesch
Camp Wood	Mrs. C. C. Merritt
Canyon Creek #2	SCS and SRVWUA
Casner Park	SCS and SRVWUA
Chalender	Forest Service - MacIntyre
Copper Basin Divide	SCS - Bill Gray
Coronado Trail	Forest Service - R. P. Julander & W. L. Sanders
Forest Dale	Fort Apache Reservation - Boyer & Endfield
Ft. Apache	SCS and SRVWUA
Fort Valley	Rocky Mountain Forest & Range Experiment Station
Frisco Divide	Forest Service - Joe Clayton & V. F. Laney
Gaddes Canyon	SCS - Bill Gray
Gentry	SCS and SRVWUA
Grand Canyon	National Park Service - Paul Mathis
Happy Jack	Emil O. Ryberg
Heber	SCS and SRVWUA
Ice King	James R. Wray
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
Maverick Fork	SCS and SRVWUA
McNary	Fort Apache Reservation - Boyer & Endfield
Milk Ranch	Fort Apache Reservation - Boyer & Endfield
Mingus Mountain	SCS - Bill Gray
Mogollon	James R. Wray
Mormon Lake	SCS and SRVWUA
Mormon Mountain	SCS and SRVWUA
Munds Park	SCS and SRVWUA
Newman Park	SCS and SRVWUA
Nutrioso	Forest Service - R. P. Julander & W. L. Sanders
Pacheta	Foch Phillips
Redstone Trail	James R. Wray
Rose Canyon	Forest Service - Allan Hinds
Snow Bowl	Forest Service - Jay Shoemaker
State Line	Forest Service - Joe Clayton & V. F. Laney
White Spar	SCS - Bill Gray
Willow Ranch	Tiny Miller
Workman Creek	Rocky Mountain Forest & Range Experiment Station

The Following Organizations Cooperate in the Arizona Snow Survey Work

FEDERAL

Department of Agriculture

Soil Conservation Service

Forest Service
- Apache Forest
- Coconino Forest
- Coronado Forest
- Gila Forest
- Kaibab Forest
- Prescott Forest
- Rocky Mountain Forest and Range Experiment Station
- Tonto Forest

Department of Commerce
- Weather Bureau
  - Arizona Section

Department of Interior

Bureau of Reclamation
- Region III

Geological Survey
- Arizona District

Bureau of Indian Affairs
- Fort Apache Reservation
- San Carlos Irrigation Project

National Park Service
- Grand Canyon National Park

Gila Water Commissioner
- Safford, Arizona

STATE

Arizona Agricultural Experiment Station

IRRIGATION PROJECTS

Salt River Valley Water Users' Association
- Phoenix, Arizona

San Carlos Irrigation and Drainage District
- Coolidge, Arizona

PRIVATE

Southwest Forest Industries, Inc.
- McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX 25, ARIZONA

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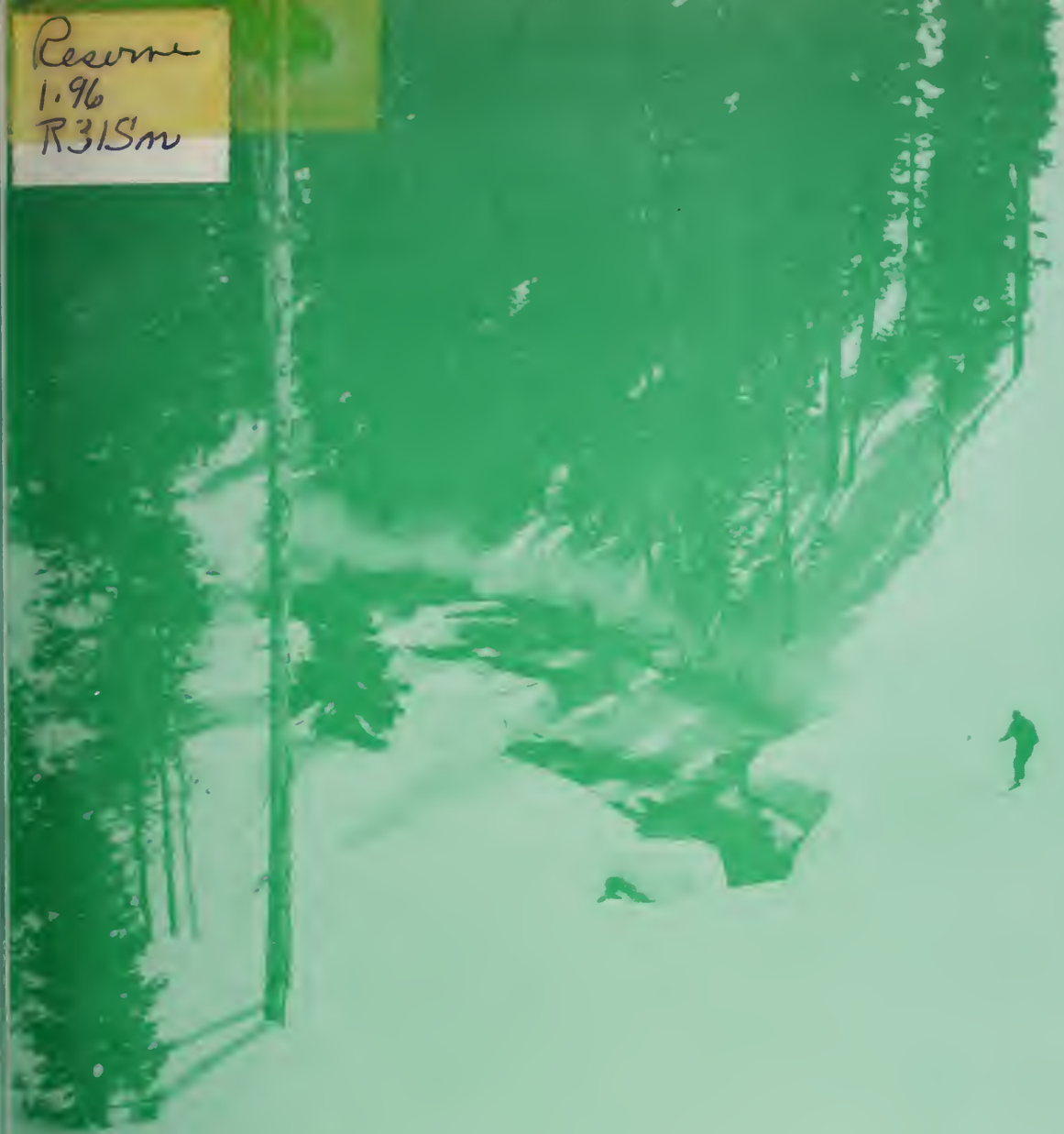
FEDERAL - STATE - PRIVATE

COOPERATIVE SNOW SURVEYS

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation , navigation , mining and industry

"The Conservation of Water begins with the Snow Survey"



WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE,
SALT RIVER VALLEY WATER USERS ASSOCIATION
and
ARIZONA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with the Federal, State and private organizations listed on the last page of this report.

AS OF
MAR. 15, 1963

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 4170, Portland 8, Oregon.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
Western United States	Monthly (Feb.-May)	Portland, Oregon	All Cooperators
STATES			
Alaska	Monthly (Mar.-May)	Palmer, Alaska	Alaska S.C.D.
Arizona	Semi-Monthly (Jan. 15 - Apr. 1)	Phoenix, Arizona	Salt R. Valley Water Users Assoc. Ariz. Agr. Exp. Station
Colorado and New Mexico	Monthly (Feb.-May)	Fort Collins, Colorado	Colo. State University Colo. State Engineer N. Mex. State Engineer
Idaho	Monthly (Jan.-June)	Boise, Idaho	Idaho State Reclamation Engineer
Montana	Monthly (Jan.-June)	Bozeman, Montana	Mont. Agr. Exp. Station
Nevada	Monthly (Jan.-May)	Reno, Nevada	Nevada Dept. of Conservation and Natural Resources - Division of Water Resources
Oregon	Monthly (Jan.-June)	Portland, Oregon	Oreg. State University Oregon State Engineer
Utah	Monthly (Jan.-June)	Salt Lake City, Utah	Utah State Engineer
Washington	Monthly (Feb.-June)	Spokane, Washington	Wn. State Dept. of Conservation
Wyoming	Monthly (Feb.-June)	Casper, Wyoming	Wyoming State Engineer

PUBLISHED BY OTHER AGENCIES

REPORTS	ISSUED	AGENCY
British Columbia	Monthly (Feb.-June)	Water Rights Br., Dept. of Lands, Forests and Natural Resources, Parliament Bldg., Victoria, B.C., Canada
California	Monthly (Feb.-May)	Calif. Dept. of Water Resources, P.O. Box 388, Sacramento, Calif.

USDA SCS PORTLAND OREG. 462

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

(Salt, Verde, Gila and Part of Lower Colorado River Basin)

Report prepared by

RICHARD W. ENZ...SNOW SURVEY SUPERVISOR
SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX 25, ARIZONA

Issued by

ROBERT V. BOYLE
STATE CONSERVATIONIST
SOIL CONSERVATION SERVICE

VICTOR I. CORBELL
PRESIDENT
SALT RIVER VALLEY WATER USERS ASSOCIATION

ARIZONA
COOPERATIVE SNOW SURVEYS
Snow Courses and Sub-Watersheds

JANUARY 1963

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE USDA SCS PORTLAND, OREG. 1-60 M-2690

INDEX to SNOW COURSES and SOIL MOISTURE STATIONS

NUMBER **	NAME	SEC	TWP	RGE ***	ELEVATION	RIVER BASIN
11P3	Antelope Park	29	19N	8E	7300	Verde.....Discontinued
9S1	Baldy (p)	28	7N	27E	9125	Salt-Little Colorado
10T1	Bear Wallow	6	12S	16E	8100	Gila
9S6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9S3	Big Lake Knoll	2	5N	28E	8800	Salt-Frisco-Little Colorado--Discontinued
7S3	Black Canyon	8	13S	11W****	6790	Gila.....Discontinued
9S10-*	Black River Divide	11	6N	27E	9100	Salt-Little Colorado
12N1	Bright Angel	34	33N	3E	8400	Lower Colorado
12R1	Camp Wood	3	16N	6W	5700	Williams-Verde
10R3-M	Canyon Creek	18	11N	15E	7500	Salt-Little Colorado--Replaced by 10R7-M
10R7-M	Canyon Creek #2	18	11N	15E	7500	Salt-Little Colorado
11R2-M	Casner Park	19	18N	8E	6930	Verde
12P1-M	Chalender	27	22N	3E	7100	Verde
10R8-*	Corduroy Creek	Lat. 34°07'N.		Long.110°08'W.	§6000	Salt
9S9	Corn Creek (p)	Lat. 33°45'N.		Long.109°45'W.	§7730	Salt.....Not Read
8S3	Corner Mountain	7	10S	17W****	8850	Gila-Frisco....Not Read
9S7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10R2	Elk	31	11N	14E	7600	Salt-Little Colorado..Discontinued
10R6	Forest Dale	2	9N	21E	6430	Salt-Little Colorado
11P2	Fort Valley	22	22N	6E	7350	Verde-Little Colorado
9R5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8S1-M	Frisco Divide	31	6S	20W****	8000	Frisco-Gila
12R4	Gaddes Canyon	11	15N	2E	7600	Verde-Agua Fria
10R5	Gentry	36	11N	15E	7600	Salt
11P1	Grand Canyon	21	30N	4E	7500	Lower Colorado
11R5	Happy Jack	30	17N	9E	7630	Verde
10R4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
8S6	Ice King	6	11S	18W	8020	Frisco-Gila
7S2	Inman	6	11S	10W****	7800	Gila
12R2	Iron Springs	22	14N	3W	6200	Williams-Verde
9S2	Maverick Fork (p)	13	6N	27E	9050	Salt
9R4	McKay Peak	13	7N	24E	8250	Salt.....Not Read
9R2-M	McNary	14	8N	23E	7200	Salt-Little Colorado
9R1	Milk Ranch	28	8N	23E	7000	Salt
12R3	Mingus Mountain	3	15N	2E	7100	Verde-Agua Fria
8S2	Mogollon	2	11S	19W****	7000	Frisco-Gila
11R4	Mormon Lake	13	18N	8E	7350	Verde-Little Colorado
11R3-M	Mormon Mountain	14	18N	8E	7500	Verde
11R1-M	Munds Park	7	18N	7E	6500	Verde
8S4	N-Bar Lake	16	10S	17W****	8600	Gila.....Not Read
8S5	Negrito	6	10S	16W****	8200	Gila.....Not Read
9S4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9S5	Pacheta	At Town of Maverick, Ariz.			7800	Salt
8S7	Redstone Trail	5	11S	18W	8600	Frisco-Gila
9N1	Roof Butte	15	8N	6W*****	8500	Little Colorado-Not Read
10T2	Rose Canyon	15	12S	16E	7300	Gila
11P4	Snow Bowl	36	23N	6E	10,260	Verde
9S8	State Line	6	6S	21W****	8000	Gila-Frisco
7S1	Taylor Creek	20	10S	10W****	7850	Gila
9R3	Trout Creek	5	7N	24E	6400	Salt.....Not Read
8N1	Washington Pass	Lat. 36°05'N.		Long.108°50'W.	8600	Little Colorado-Not Read
12R5	White Spar	19	13N	2W	6000	Verde
13P1	Willow Ranch	16	21N	11W	5000	Williams
10R1	Woods Canyon	15	11N	13E	7640	Salt-Little Colorado--Discontinued
10S1	Workman Creek	33	6N	14E	6900	Salt

* Soil Moisture Station only

** Number indicates location of snow course within coordinate rectangle. Thus 9N1 is Course #1 in coordinate rectangle 9N.

*** All in Gila and Salt River Base and Meridian except where otherwise indicated.

**** New Mexico Principal Meridian

***** Navajo Base

M Soil Moisture Station installed on or in vicinity of snow course.

§ Unsurveyed

(p) Storage gage installed on or in vicinity of snow course.

ARIZONA WATER SUPPLY OUTLOOK

MARCH 15, 1963

Near normal water supplies are anticipated in the major irrigated areas this year. Although streamflow will be low on the Salt River System, reservoir storage is good. Average streamflow is forecast on the Gila River.

SNOW COVER: Much below average snow cover was reported on all watersheds. Only the high elevation snow courses reported any significant amount of snow. The snow pack on March 15 was 46% of average on the Salt River Watershed, 29% on the Gila, and 2% on the Verde Watershed. A heavy storm crossed Arizona over the week end, dropping 8-16 inches of snow in the mountains. This will improve conditions somewhat, but will not bring the snow cover up to normal.

RESERVOIR STORAGE: A drop in storage was reported on the Salt River Project System and in San Carlos Reservoir since March 1. Irrigation demand is high this time of year, but inflow has been low. The Salt River Project Reservoirs now contain 137% of average and 52% of capacity. Storage in San Carlos Reservoir is 119% of average. All reservoirs should catch small amounts of runoff from the week-end storm since the March 15 measurements. Lake Pleasant, Show Low Lake and Watson Lake are, nevertheless, very low. Lyman Reservoir contains over twice the normal storage for this date as a result of last year's good runoff.

SOIL MOISTURE: The surface soil at low and intermediate elevations was dry until the recent storm. Subsoils are near field capacity at 7000' and above. Lower elevations, particularly on the Verde Drainage, are very dry. Good runoff may be expected from the 9000' level from additional precipitation.

PRECIPITATION: February precipitation was generally below normal on Arizona Watersheds. A small area in eastern Arizona extending into New Mexico received good storms. For the winter season, October-February, precipitation has been 150% of normal on the Gila Watershed, slightly below normal on the Salt, and 65% of normal on the Verde. In spite of the recent good storm, precipitation is still below normal at most stations so far this month.

STREAMFLOW AND WATER SUPPLY: Streamflow on the major streams has dropped considerably since March 1. The first two weeks of March produced 18,200 acre feet of water on the Salt River, 5,200 acre feet on the Verde River, and 13,400 acre feet on the Gila River. Streamflow on the Salt River was down to 475 cfs on March 15. As a result of the recent storm, the Salt and Verde Rivers are now (March 18) flowing 565 cfs and 258 cfs respectively, and rising. Streamflow forecasts have been reduced slightly since March 1, as a result of the below normal precipitation so far this month. Streamflow on the Salt River Project is forecast to be 45% of average; near normal streamflow is forecast on the Gila River. Water supplies will be adequate in the major irrigated areas this year.

STREAM FLOW FORECASTS - MARCH 15, 1963

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

SUB-WATERSHED, STREAM and STATION	SEASONAL STREAM FLOW IN THOUSANDS OF ACRE FEET FORECAST PERIOD - MARCH - MAY, INCLUSIVE					
	Forecast Runoff 1963	Percent 15-Year Average	Measured Runoff 1962	1961	1960	1943-57 Average
Salt River at Intake	110	54	416.7	65.1	320.0	200.4
Tonto River above Roosevelt	6	24	37.6	4.8	40.3	25.0
Verde River above Horseshoe	42	34	134.9	46.3	139.3	124.9
Gila River at Virden	27	98	62.7	12.9	58.7	27.6
Gila River near Solomon	50	96	123.4	17.7	113.5	52.3
Frisco River at Clifton	24	95	59.2	10.5	59.2	25.3
Little Colorado River above Lyman Dam (March-June, Incl.)	3.0	54	24.5	1.0	13.5	5.6

Granite Creek is forecast to flow enough additional water to fill Watson Lake one-fifth of capacity.

STATUS OF ARIZONA RESERVOIR STORAGE - ABOUT MARCH 15, 1963

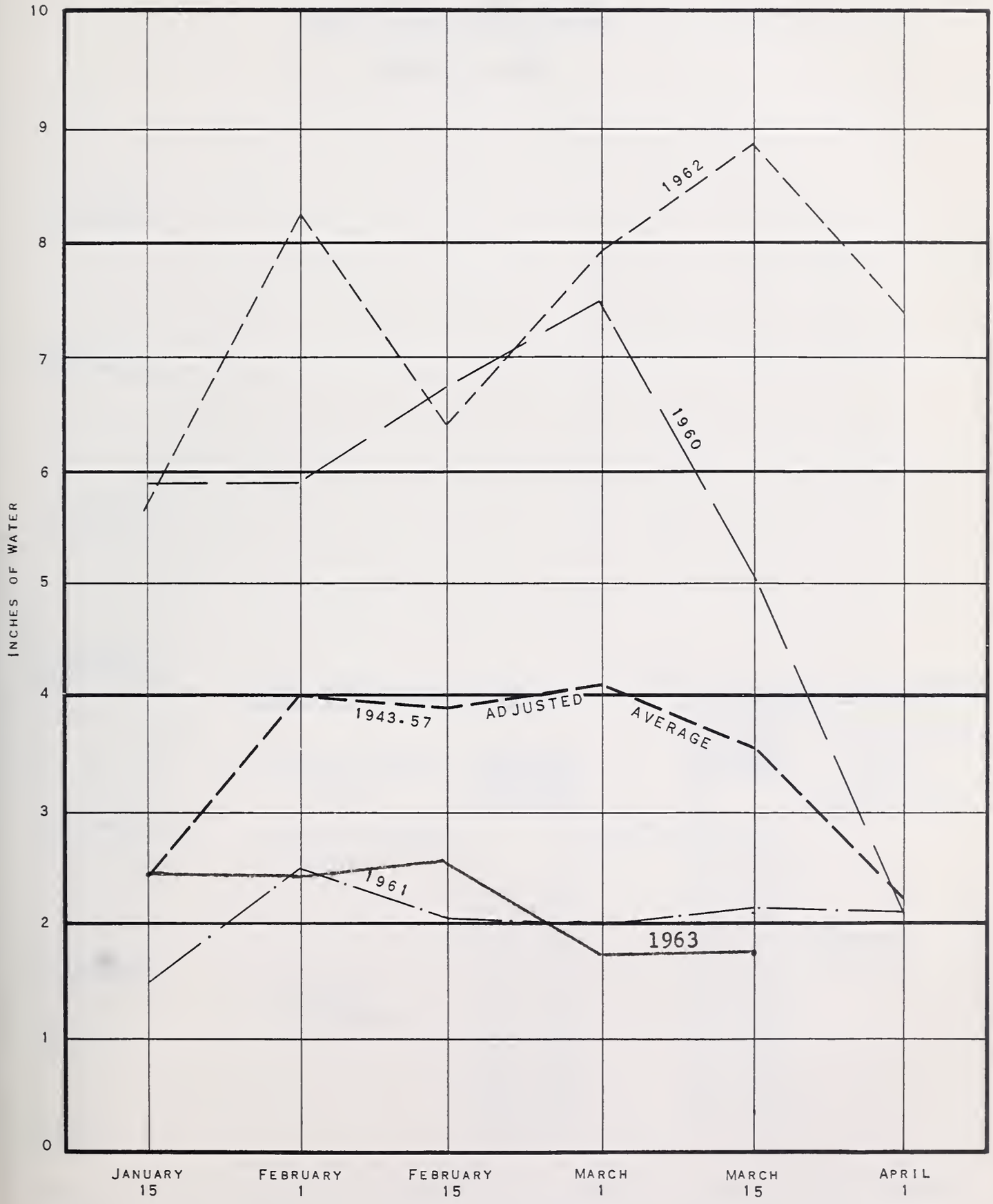
SUB-WATERSHED and/or STREAM	RESERVOIR	USABLE CAPACITY 1000s ACRE FT.	USABLE STORAGE - 1000s ACRE FEET			
			1963	1962	1961	15-Year Average 1943-57
		GILA RIVER SUB-WATERSHED				
Agua Fria	Lake Pleasant	163.8	2.8	15.9	26.7	27.3
Granite	Watson Lake	4.7	0.7	---	---	---
Gila	San Carlos	1,206.0	128.4	163.9	0.6	108.0
Verde	Bartlett	179.5	24.7	95.7	39.0	67.3
Verde	Horseshoe	142.8	1.5	21.2	9.4	20.5*
Salt	Roosevelt	1,382.0	700.0	735.2	822.0	450.4
Salt	Apache	245.0	229.2	195.4	242.0	207.3
Salt	Canyon	58.0	53.8	54.6	50.3	44.3
Salt	Saguaro	70.0	65.2	66.5	65.2	44.5
		LOWER COLORADO RIVER SUB-WATERSHED				
Colorado	Lake Havasu	619.4	530.1	552.2	542.7	566.1
Colorado	Lake Mohave	1,810.0	1,723.5	1,748.0	1,690.0	1,486.2*
Colorado	Lake Mead	27,207.0	22,256.0	18,130.0	18,550.0	16,686.0
Little Colorado	Lyman	30.6	13.5	4.4	6.8	6.4
Little Colorado	Show Low Lake	5.1	1.8	5.1	0.0	---

* Average is for less than 15 years of record in the 1943-57 period.

RELATIVE SNOW WATER ACCUMULATION

ARIZONA

MARCH 15, 1963

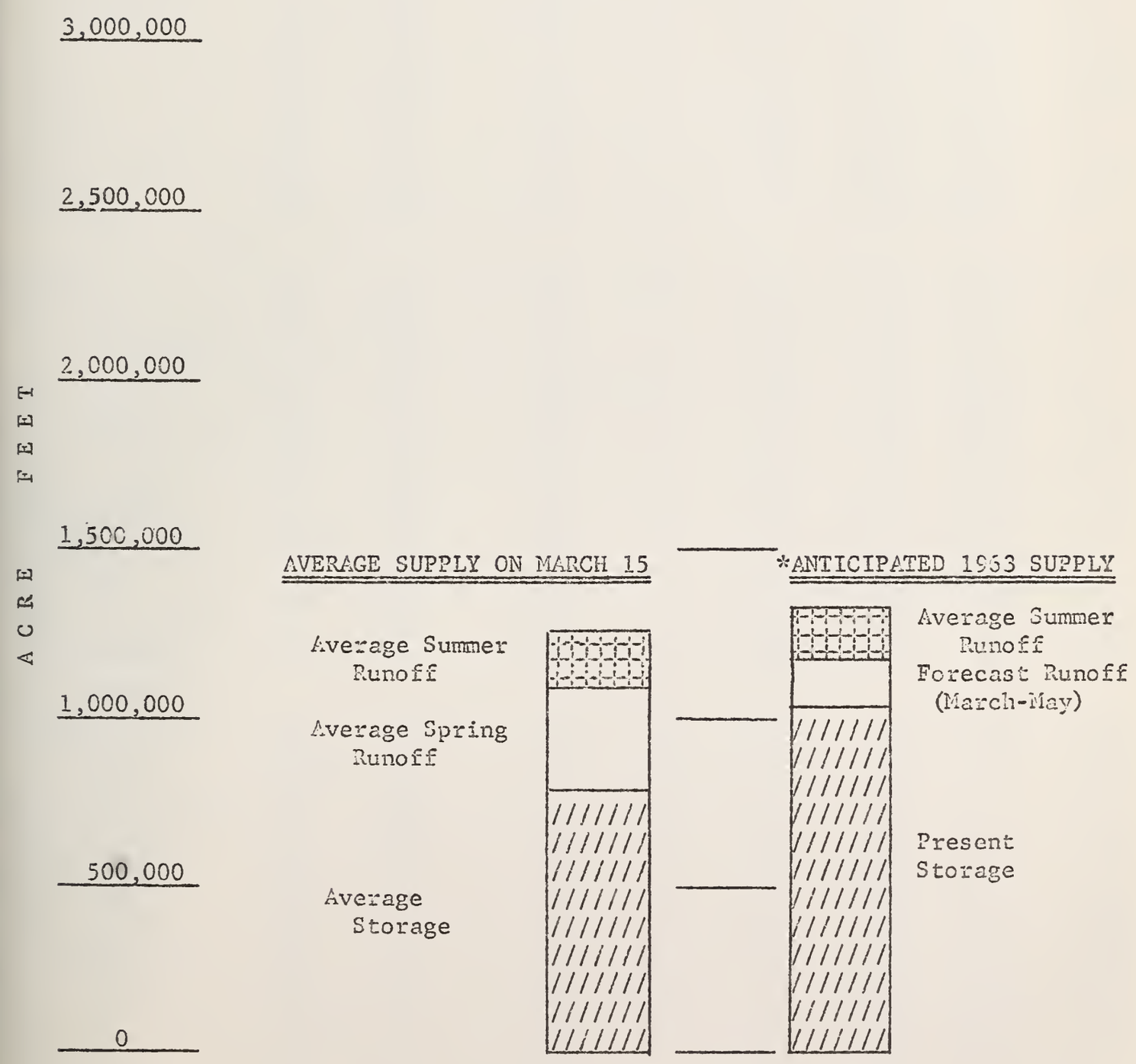


This graph represents the average snow water content on eleven selected snow courses on Arizona Sub-Watersheds.

WATER SUPPLY INVENTORY

SALT RIVER VALLEY SYSTEM

MARCH 15, 1963



* Based on present Storage + Forecast Spring Runoff + Average Summer runoff.

ARIZONA SNOW SURVEYS - ABOUT MARCH 15, 1963

SUB-WATERSHED and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS 1963 Date of Survey	Snow Depth (In.)	Water Content (In.)	PAST RECORD Water Content (Inches) 1962	1961	1943-57 Average
GILA RIVER								
Bear Wallow	10T1	8100	3/16	5	1.8	14.8	0.7	1.6**
Beaver Head	9S6	8000	3/14	1	0.5	6.4	1.2	1.9
Coronado Trail	9S7	8000	3/15	0	0.0	3.4	0.4	1.9
Frisco Divide	8S1-M	8000	3/14	1	0.3	2.7	0.6	1.2
Ice King	8S6	8000	3/14	18	7.1	11.8	4.1	---
Inman	7S2	7800	3/14	0	0.0	T	0.0	0.3**
Mogollon	8S2	7000	3/14	5	1.7	3.2	1.4	1.2**
Nutrioso	9S4	8500	3/15	0	0.0	2.8	0.6	1.2
Redstone Trail	8S7	8600	3/14	19	7.0	11.2	5.4	---
Rose Canyon	10T2	7300	3/16	0	0.0	8.1	0.0	0.5**
State Line	9S8	8000	3/14	T	T	2.2	0.0	1.4
SALT RIVER								
Baldy*	9S1	9125	3/12	18	5.3	17.3	6.6	7.1**
Beaver Head	9S6	8000	3/14	1	0.5	6.4	1.2	1.9
Canyon Creek #2	10R7-M	7500	3/11	0	0.0	7.7	1.5	---
Coronado Trail	9S7	8000	3/15	0	0.0	3.4	0.4	1.9
Forest Dale	10R6	6430	3/15	0	0.0	1.5	0.0	0.4
Ft. Apache *	9R5	9160	3/12	25	6.6	17.4	6.0	8.0**
Gentry	10R5	7600	3/11	0	0.0	6.9	0.8	2.2**
Heber	10R4	7600	3/11	0	0.0	7.4	1.1	2.4**
Maverick Fork	9S2	9050	3/12	21	5.9	20.2	6.8	9.4**
McNary	9R2-M	7200	3/15	0	0.0	5.7	0.0	1.3
Milk Ranch	9R1	7000	3/15	0	0.0	2.4	0.0	0.6
Nutrioso	9S4	8500	3/15	0	0.0	2.8	0.6	1.2
Pacheta	9S5	7800	3/15	0	0.0	8.0	0.0	2.0**
Workman Creek	10S1	6900	3/14	2	0.8	16.1	1.5	2.8**
VERDE RIVER								
Camp Wood	12R1	5700	3/14	0	0.0	0.0	0.0	0.5**
Casner Park	11R2-M	6930	3/13	0	0.0	8.7	0.8	2.9**
Chalender	12P1-M	7100	3/14	0	0.0	6.7	T	2.7**
Copper Basin Div.	12R6	6720	3/14	0	0.0	---	---	---
Fort Valley *	11P2	7350	3/14	0	0.0	7.1	0.0	1.9**
Gaddes Canyon	12R4	7600	3/14	7	1.9	11.2	0.9	---
Happy Jack	11R5	7630	3/14	0	0.0	8.7	0.8	2.8**
Iron Springs *	12R2	6200	3/14	0	0.0	1.6	0.0	0.6**
Mingus Mountain	12R3	7100	3/14	0	0.0	1.4	0.0	0.7**
Mormon Lake *	11R4	7350	3/13	T	T	9.5	1.8	4.3**
Mormon Mountain	11P3-M	7500	3/13	1	0.5	12.1	1.6	6.5**
Munds Park	11R1-M	6500	3/13	0	0.0	4.4	0.0	2.2**
Newman Park	11R6	6750	3/13	0	0.0	---	---	---
Snow Bowl	11P4	10260	No Report			18.4	4.2	---
White Spar	12R5	6000	3/14	0	0.0	---	---	---

* On Adjacent Drainage

** 1943-57 Adjusted Average

ARIZONA SNOW SURVEYS - ABOUT MARCH 15, 1963

SUB-WATERSHED and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS 1963 Date of Survey	Snow Depth (In.)	Water Content (In.)	PAST RECORD Water Content (Inches) 1962	1961	1943-57 Average
WILLIAMS RIVER								
Camp Wood*	12R1	5700	3/14	0	0.0	0.0	0.0	0.5 **
Copper Basin Div.*	12R6	6720	3/14	0	0.0	---	---	---
Iron Springs	12R2	6200	3/14	0	0.0	1.6	0.0	0.6 **
Willow Ranch	13P1	5000	3/15	1	0.8	T	0.0	0.1 **
LOWER COLORADO RIVER								
Bright Angel	12N1	8400	No Survey			No Survey		10.4 **
Chalender *	12P1-M	7100	3/14	0	0.0	6.7	T	2.7 **
Fort Valley	11P2	7350	3/14	0	0.0	7.1	0.0	1.9 **
Grand Canyon	11P1	7500	3/14	0	0.0	4.0	0.0	1.6 **
LITTLE COLORADO RIVER								
Baldy	9S1	9125	3/12	18	5.3	17.3	6.6	7.1 **
Canyon Creek #2	10R7-M	7500	3/11	0	0.0	7.7	1.5	---
Forest Dale	10R6	6430	3/15	0	0.0	1.5	0.0	0.4
Ft. Apache	9R5	9160	3/12	25	6.6	17.4	6.0	8.0 **
Fort Valley	11P2	7350	3/14	0	0.0	7.1	0.0	1.9 **
Gentry	10R5	7600	3/11	0	0.0	6.9	0.8	2.2 **
Happy Jack *	11R5	7630	3/14	0	0.0	8.7	0.8	2.8 **
Heber	10R4	7600	3/11	0	0.0	7.4	1.1	2.4 **
McNary	9R2-M	7200	3/15	0	0.0	5.7	0.0	1.3
Mormon Lake	11R4	7350	3/13	T	T	9.5	1.8	4.3 **
Mormon Mountain	11R3-M	7500	3/13	1	0.5	12.1	1.6	6.5 **
Nutrioso	9S4	8500	3/15	0	0.0	2.8	0.6	1.2

* On Adjacent Drainage

** 1943-57 Adjusted Average

PRECIPITATION AT SELECTED ARIZONA STATIONS [1]

Station	Precipitation (Inches)			
	February - 1963		Current Water-Year (Oct.1962 - Feb. 1963)	
	Total	Departure from Normal	Total	Departure from Normal
Alpine	1.20 *	- .18	10.24 *	+ 3.46
Ash Fork	.89	- .26	2.66	- 2.11
Clifton	1.85	+ .94	6.50	+ 2.22
Douglas Smelter	.20	- .39	2.59	- .49
Flagstaff WBAS **	1.28	- .50	5.55	- 2.23
Payson Ranger Station	1.65	- .54	6.32	- 2.74
Phoenix WBAS	1.16	+ .31	2.22	- 1.16
Prescott WBAS	.82	- .26	2.61	- 1.71
Springerville	.36	- .17	3.27	+ .30
Tucson WBAS	.81	- .03	3.04	- .80
Winslow WBAS	.75	+ .27	4.05	+ 1.60
Yuma WBAS	.13	- .23	1.09	- .48

[1] Data and Analysis furnished by Paul C. Kangieser, Arizona State Climatologist, U. S. Weather Bureau, Phoenix, Arizona.

* = Estimated Value.

** = Weather Bureau Airport Station

LIST OF SNOW SURVEYORS

SNOW COURSE	SURVEYOR
Baldy	SCS and SRVWUA
Bear Wallow	Forest Service - Allan Hinds
Beaver Head	N. A. Josh
Bright Angel	National Park Service - Vern Ruesch
Camp Wood	Mrs. C. C. Merritt
Canyon Creek #2	SCS and SRVWUA
Casner Park	SCS and SRVWUA
Chalender	Forest Service - MacIntyre
Copper Basin Divide	SCS - Bill Gray
Coronado Trail	Forest Service - R. P. Julander & W. L. Sanders
Forest Dale	Fort Apache Reservation - Boyer & Endfield
Ft. Apache	SCS and SRVWUA
Fort Valley	Rocky Mountain Forest & Range Experiment Station
Frisco Divide	Forest Service - Joe Clayton & V. F. Laney
Gaddes Canyon	SCS - Bill Gray
Gentry	SCS and SRVWUA
Grand Canyon	National Park Service - Paul Mathis
Happy Jack	Emil O. Ryberg
Heber	SCS and SRVWUA
Ice King	James R. Wray
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
Maverick Fork	SCS and SRVWUA
McNary	Fort Apache Reservation - Boyer & Endfield
Milk Ranch	Fort Apache Reservation - Boyer & Endfield
Mingus Mountain	SCS - Bill Gray
Mogollon	James R. Wray
Mormon Lake	SCS and SRVWUA
Mormon Mountain	SCS and SRVWUA
Munds Park	SCS and SRVWUA
Newman Park	SCS and SRVWUA
Nutrioso	Forest Service - R. P. Julander & W. L. Sanders
Pacheta	Foch Phillips
Redstone Trail	James R. Wray
Rose Canyon	Forest Service - Allan Hinds
Snow Bowl	Forest Service - Jay Shoemaker
State Line	Forest Service - Joe Clayton & V. F. Laney
White Spar	SCS - Bill Gray
Willow Ranch	Tiny Miller
Workman Creek	Rocky Mountain Forest & Range Experiment Station

The Following Organizations Cooperate in the Arizona Snow Survey Work

FEDERAL

- Department of Agriculture
  - Soil Conservation Service
  - Forest Service
    - Apache Forest
    - Coconino Forest
    - Coronado Forest
    - Gila Forest
    - Kaibab Forest
    - Prescott Forest
    - Rocky Mountain Forest and Range Experiment Station
    - Tonto Forest
- Department of Commerce
  - Weather Bureau
    - Arizona Section
- Department of Interior
  - Bureau of Reclamation
    - Region III
  - Geological Survey
    - Arizona District
  - Bureau of Indian Affairs
    - Fort Apache Reservation
    - San Carlos Irrigation Project
  - National Park Service
    - Grand Canyon National Park
- Gila Water Commissioner
  - Safford, Arizona

STATE

- Arizona Agricultural Experiment Station

IRRIGATION PROJECTS

- Salt River Valley Water Users' Association
  - Phoenix, Arizona
- San Carlos Irrigation and Drainage District
  - Coolidge, Arizona

PRIVATE

- Southwest Forest Industries, Inc.
  - McNary, Arizona

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"The Conservation of Water begins with the Snow Survey"